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An Annotated Bibliography of the Clay-backed Cutworm

Agrotis gladiaria (Morrison)

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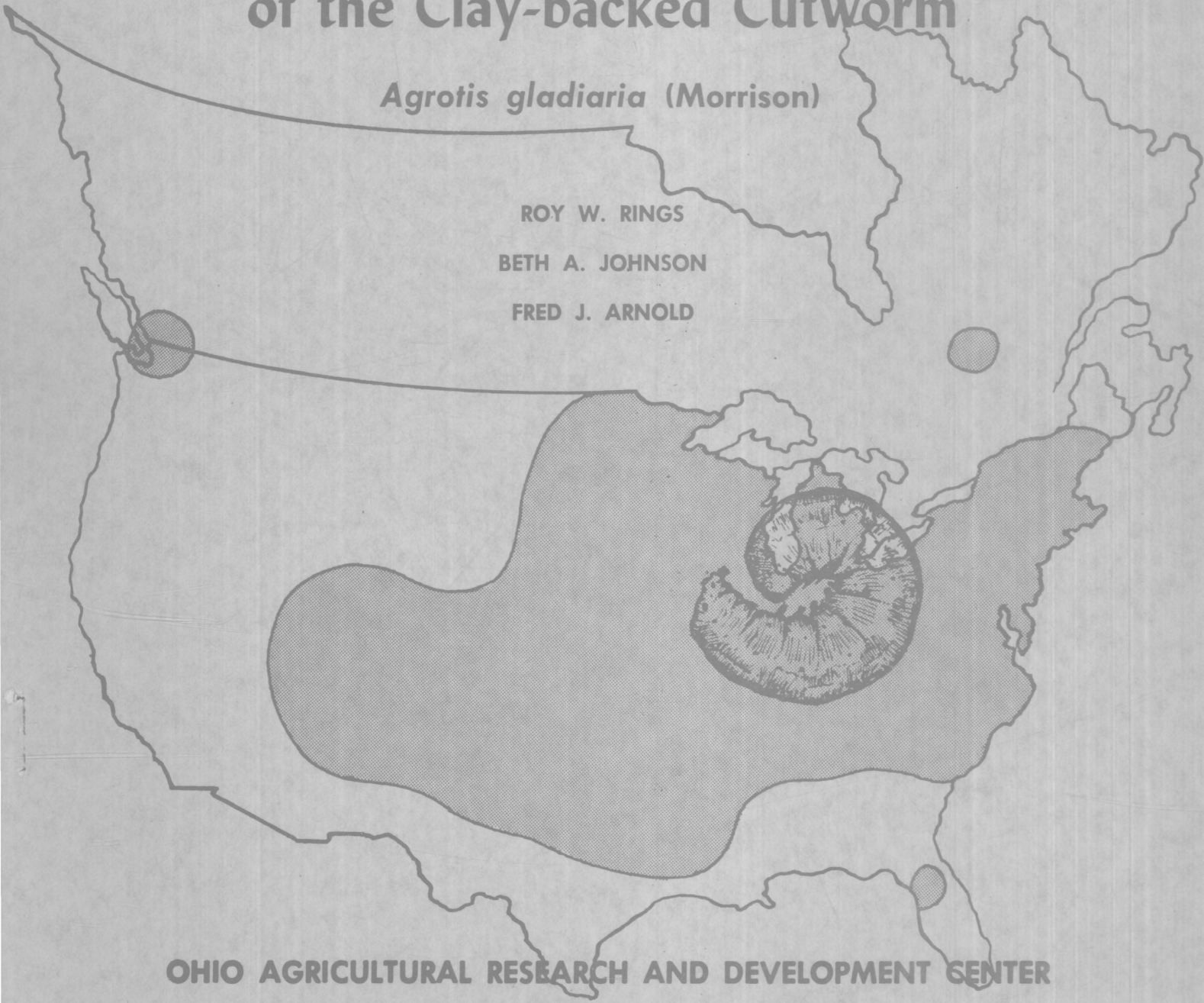

OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
WOOSTER, OHIO

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AN ANNOTATED BIBLIOGRAPHY OF THE CLAY-BACKED CUTWORM, *Agrotis gladiaria* (Morrison)[1]

Roy W. Rings[2], Beth A. Johnson[3], and Fred J. Arnold[3]

Introduction

The purpose of this circular is to consolidate the abstracted literature on the clay-backed cutworm, *Agrotis gladiaria* (Morrison). This brings together research and extension information on developmental biology, ecology, host range, habits, geographical and seasonal distribution, and control for pest management purposes. It is not intended for taxonomic studies since most faunal lists, museum lists, and checklists cannot be abstracted for the recovery of a single species.

This cutworm was originally described by H. K. Morrison in 1875 as *Agrotis gladiaria*. In the same year, C. V. Riley described the species as *Agrotis morrisoniana* nov. sp., but the name *gladiaria* has priority. Smith (1893) lists the species under the genus *Feltia* and reported that Morrison's type specimen was deposited in the Tepper collection.

The clay-backed cutworm ranges from Nova Scotia to southern British Columbia and from southern Quebec to Florida. It is most abundant in the north central and eastern United States.

This cutworm is a univoltine species and hibernates as early (1st and 2nd) instar larvae, according to Crumb (1929). The egg, six larval instars, pupa, and moth are described by Crumb (1929). The moth is also described by Forbes (1954) and is illustrated in color by Holland (1934).

Although this species is not a frequent pest of economic importance, local outbreaks of serious proportions have occurred in many states east of the Mississippi River. In 1887 and 1888, it was the most abundant and by far the most destructive species in Illinois and populations were nearly as abundant in 1901 (Forbes 1890, 1904). Garman (1895) described a notable outbreak in Kentucky in the spring of 1895 in which larvae dispersed from centers of infestation in such numbers that they were thought to be armyworms. Widespread damage was reported on clover, corn, tobacco, hemp, onions, and other garden crops. Many newly set strawberry beds were also destroyed and the larvae caused severe injury to the young canes of blackberry and raspberry.

In addition to host plants mentioned above, larvae have also been reported to feed on or cause damage to alfalfa, aster, barley, bean, cabbage, dock, goldenrod, grasses, oats, pansy, peas, potato, sweet potato, and tomato.

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The bibliographical information was obtained by a search of the abstracting journals in The Ohio State University and the Ohio Agricultural Research and Development Center Libraries for the years 1864 to 1975. Photocopies or microfilms of material unavailable at these two libraries were obtained from the National Agricultural Library or from other university libraries.

The authors have established a current awareness profile on the clay-backed cutworm in cooperation with the Mechanized Information Center of The Ohio State University Libraries. This computerized system of retrieval will aid in keeping this bibliographical information current. Supplementary bibliographical data on clay-backed cutworm will be summarized at yearly intervals and will be available on request from the Ohio Agricultural Research and Development Center.

Entries are listed alphabetically by author except in cases where the publication is anonymous or more likely to be identified with the governmental agency under which it was published. The abbreviations in the citations follow the American standard for periodical title abbreviations which was published in Biological Abstracts, 45(13):4347-4361. All references in this publication deal with *Agrotis gladiaria* (Morrison); however, the scientific name used in the original article is also used in the annotation so there is no question as to the species being cited. The numbers in parentheses following the annotation represent the page numbers which include information on the clay-backed cutworm if they are different from the citation page numbers.

Bibliography

Ainslie, G. G. 1917. Crambid moths and light. J. Econ. Entomol., 10:114-123.
In entomological literature there are many conflicting and confusing statements concerning the value of trap lanterns and poisoned baits in reducing the numbers of night flying moths of injurious species. The efficiency of a trap lantern depends largely on the time in the life of a moth at which it can be attracted; *i.e.*, before, during, or after the period of egg deposition. Sex of the moths must also be known. While this statement was made in reference to crambid moths, the author felt the same principles were true of a number of noctuids, including *Feltia gladiaria*. (115)

Anonymous. 1952. Some important insects. U. S. Dep. Agr. Yearbook 1952.
The clay-backed cutworm is illustrated on plate 48 in a supplementary section at the back of the Yearbook of Agriculture 1952 under the title, Some Important Insects. "The clay-backed cutworm is generally distributed east of the Rocky Mountains. It has only one generation a year and passes the winter as a partly grown caterpillar. When the first plants are set out in the spring, it cuts them off just above the soil surface at night and drags them to its burrow nearby for later feeding. The clay-backed cutworm reaches maturity in late spring, remains inactive during the hot summer, and pupates during the early fall. The adult moths emerge in the fall and lay eggs in grassy fields." The author discovered eggs and small larvae of a moth in *Helianthus* heads at Oak Harbor, Ohio. When reared to the moth stage, they proved to be *Feltia subgothica*. In a discussion of the genus *Feltia*, the life history of *gladiaria* was described. (83)

Beutenmüller, W. 1901. Descriptive catalogue of the noctuidae found within 50 miles of New York City. Bull. Amer. Mus. Nat. Hist., 14:229-312.
The moth of *Feltia gladiaria* (Morr.) is described. This species is not common. It somewhat resembles *F. subgothica* in general appearance, but is considerably darker. It is usually found in September on goldenrod during the day. (279)

Blickenstaff, C. C. 1965. Common names of insects approved by the Entomological Society of America. Bull. Entomol. Soc. Amer., 11(4):290.
The approved common name of *Agrotis gladiaria* (Morrison) is the clay-backed cutworm.

Brimley, C. S. 1938. The insects of North Carolina. N. C. Dep. Agr. 560 pp.
"*F. gladiaria* Morr. Raleigh, Whiteville, Wilmington, Waynesville, Crumpler, October; aestivates as resting larva (prepupa); our worst spring cutworm." (270)

Chamberlin, F. S. and N. Allen. 1957. Tobacco cutworms. How to control them. U.S. Dep. Agr. Leaflet 417:1-8.
The clay-backed cutworm (*Feltia gladiaria*) is found in the northern part of the United States. The larva is greenish to dark brown and has a broad, pale stripe down the back. (4, Fig. 6)

Cook, W. C. 1921. Studies on the flight of nocturnal lepidoptera. 18th Rep. Minn. State Entomol., Agr. Exp. Sta.:43-56.
Feltia gladiaria moths had a peak seasonal abundance from July 29 to Sept. 17, according to a table of the seasonal abundance of nocturnal moths during 1920 at University Farm, Minn. (46)

Crosby, C. R. and M. D. Leonard. 1918. Manual of vegetable garden insects. The Macmillan Co., New York. 391 pp.
The distribution, food plants, larva, moth, and appearance of the clay-backed cutworm, *Feltia gladiaria*, are discussed. (274-275)

Crumb, S. E. 1915. A key to the cutworms affecting tobacco. J. Econ. Entomol., 8:392-396.
This is a key to the cutworms affecting tobacco in the United States, including *Feltia gladiaria*.

Crumb, S. E. 1926. Tobacco cutworms and their control. U. S. Dep. Agr., Farmers' Bull. 1494:1-13.
The clay-backed cutworm is discussed as a pest of tobacco. The larva and adult are illustrated. (5-6) Control of cutworms in general is discussed. (7-13)

Crumb, S. E. 1927. The armyworms. Brooklyn Entomol. Soc. Bull. 22:41,44.
A key to the species of larvae having the armyworm habit is given. The fully grown larva, distribution, and food plants of the clay-backed cutworm are described. (44)

Crumb, S. E. 1929. Tobacco cutworms. U. S. Dep. Agr. Tech. Bull. 88:1-179.
Feltia gladiaria is included in keys to larvae and pupae. Its distribution, habits, economic importance, seasonal history, parasites, and predators are discussed. All life stages are described. The author found six larval instars. Natural enemies in Tennessee included *Meteorus vulgaris* Cress., *Ophion* sp., and the pathogens *Metarrhizium anisopliae, Sorosporella uvella* (Krass.), *Botrytis rileyi*, Fabl., *Fusarium* sp., *Beauveria* sp., *Entomophthora* sp., a bacterial disease, and a polyhedral disease. (68-73)

Crumb, S. E. 1956. The larvae of the Phalaenidae. U. S. Dep. Agr., Tech. Bull. 1135:1-356.
The author presents keys to noctuid larvae and a technical description of *Agrotis gladiaria*. The species is found generally east of the Mississippi River but is not common south of the latitude of Tennessee and Virginia. In the west, larvae have been seen from South Dakota, Colorado, and Utah. The larva is a rather general feeder on field, garden, and berry crops and has been particularly destructive in Illinois and Kentucky. (91)

Davidson, R. H. 1966. Insect pests of farm, garden, and orchard. 6th Ed. John Wiley and Sons, Inc., New York. 675 pp.
Some of the better-known cutworms are the following: the black cutworm, the dingy cutworm, the clay-backed cutworm, the granulate cutworm, the bronzed cutworm, the variegated cutworm, the spotted cutworm, the army cutworm, the pale western cutworm, the glassy cutworm, the bristly cutworm, the red-backed cutworm, the dark-sided cutworm, the striped cutworm, and the black army cutworm. (151)

Dirks, C. O. 1937. Biological studies of Maine moths by light trap methods. Maine Agr. Exp. Sta. Bull. 389:33-162.
A total of 59 moths of *Feltia gladiaria* were captured in the 4-year period (1931-1934). The flight period extended from August 22 to Sept. 25. The main flight occurred during the first 2 weeks of September. Only four gravid moths were found among the total number of moths. (74)

Ferguson, D. C. 1954. The lepidoptera of Nova Scotia. Proc. Nova Scotian Inst. Sci., 23(3):161-375.
"1422 *A. gladiaria* Morr. Plate V, Figure 12, Armdale, Sept. 16, 1947, one specimen at light." (225)

Ficht, G. A. 1940. Notes on Indiana Noctuidae. Proc. Indiana Acad. Sci., 49:243-253.
"*F. gladiaria* Morr. (1395). Clay-backed cutworm. Abundant from early September through October. DeKalb Co., Sept. 9 - Oct. 22; Tippecanoe Co., Sept. 25, Oct. 5 (J. J. D.), Oct. 9 (P. S. C.)." (244)

Fletcher, J. and A. Gibson. 1908. Entomological record 1908. Entomol. Soc. Ont. Annu. Rep. 39:99-116.
"1,544. *Feltia gladiaria* Morr., Trenton (Evans). This is the first Canadian specimen we have seen." (105)

Forbes, S. A. 1890. Notes on cutworms. 16th Rep. State Entomol. Ill. pp. 84-97.
Feltia gladiaria was the most abundant and by far the most destructive cutworm of Illinois in 1887. The habits, habitat, larva, parasites, and food plants are described. (89-93)

Forbes, S. A. 1904. The more important insect injuries to Indian corn. Univ. Ill. Agr. Exp. Sta. Bull. 95:331-399.
The appearance, distribution, food plants, habits, and brief life history of the clay-backed cutworm, *Feltia gladiaria*, are discussed. (358-359)

Forbes, S. A. 1905. The more important insect injuries to Indian corn. Ill. State Entomol. Rep. 23:1-273.
This report is identical to the previous citation.

Forbes, W. T. M. 1954. Lepidoptera of New York and neighboring states. Noctuidae. Cornell Univ. Agr. Exp. Sta. Mem. 329:1-433.
The larva and moth of the clay-backed cutworm, *Feltia gladiaria*, are described. (45-46)

Frost, S. W. 1955. Cutworms of Pennsylvania. Penn. State Univ. Agr. Exp. Sta. Bull. 596:1-29.
The clay-backed cutworm, *Feltia gladiaria*, is a true cutworm and a common species in the northern part of the United States. Its food plants include corn, potato, tomato, cabbage, bean, other legumes, and grasses. It hibernates in the larval stage and is a voracious feeder in the early spring when it becomes active. The larva is greenish to dark brown with a broad, pale dorsal stripe. There is a single generation a year. The adults fly from September to October and they lay eggs which produce larvae that hibernate. (19)

Garman, H. 1895. Cutworms in Kentucky. Ky. Agr. Exp. Sta. Bull. 58:87-109.
The author described *Feltia gladiaria* larvae as "traveling cutworms." Moths did not emerge from larvae collected in April until Sept. 17. The species has a long period of aestivation during most of the summer. (93-95)

Gibson, A. 1910. The entomological record for 1910. Entomol. Soc. Ont. Annu. Rep. 41:101-120.
"1544. *Feltia gladiaria* Morr. Trenton, Ont., Sept. 13, second specimen taken (Evans)." (109)

Gossard, H. A. 1917. Cutworms. Their habits, characteristics, and means of control. Ohio Agr. Exp. Sta. Mon. Bull., 2(3):85-90.
The habits, characteristics, and means of control of cutworms are discussed. The clay-backed cutworm, *Feltia gladiaria*, is generally dark colored, varying from greenish gray to dark brown. The back is grayish white or straw colored or may be reddish brown. A white, thread-like line, bordered with a darker area along the middle of the back, bisects the clay-colored area. (87)

Grote, A. R. 1882. Preliminary list of the North American species of *Agrotis*, with descriptions. Bull. U. S. Geol. and Geog. Surv. Ter. 6:149-164.
Mr. Morrison described *Agrotis gladiaria*. (151) "*gladiaria* Morr., P.S.N.S.P. 59, 1875. Texas; Kansas." (163)

Harrendorf, K. 1959. Occurrence and relative abundance of certain noctuid moths in northwest Arkansas, Fall 1957. J. Kansas Entomol. Soc., 32(1):41-44.
Nineteen species of noctuids, including *Feltia gladiaria*, were recorded between Oct. 1 and Dec. 6, 1957, at Fayetteville, Ark. The relative abundance was determined from light trap data. A very superficial study.

Hart, C. A. 1903. Synopsis of insect collections for distribution to Illinois High Schools. Illinois State Laboratory of Natural History, pp. 7-64.
"117. *Feltia gladiaria* Morr. (*Agrotis gladiaria* or *morrisoniana*). L., Clay-backed cutworm. F., clover, corn, and garden vegetables. H. as larva destructive from mid-April to early June; enters earth in first part of June and remains in oval cell until Aug., then pupates; I. Sept. and first half of Oct. Adults common at electric lights and on *Compositae* at twilight. Resembles *subgothica*, but round spot small, circular, not V-shaped." (32)

Hawkins, J. H. 1930. Tarsal claws of noctuid larvae. Ann. Entomol. Soc. Amer., 23:393-396.
The tarsal claws of *Feltia gladiaria* were measured and the ratios of the various parts of the claw are presented in a table. (396)

Holland, W. J. 1968. The moth book. A guide to the moths of North America. Dover Publ., Inc., New York. 479 pp.
"(3) *Feltia gladiaria* Morrison, Plate XXII, Fig. 19, ♀. (The swordsman dart.) Syn. *morrisoniana* Riley. The distribution of this species is the same as that of the previous" (*Feltia herilis*). (186)

Kimball, C. P. 1965. The Lepidoptera of Florida. An annotated checklist. Fla. Dep. Agr., Div. Plant Ind., Gainesville. 363 pp.
"1422 *A. gladiaria* Morrison. Clay-backed cutworm. Pl. XI, Fig. 9, ♂. Proc. Boston Soc. Nat. Hist. 17:162. 1874. I. Quincy: Crumb (1929, p. 68). Food: grasses and many other plants." (85)

Knutson, H. 1944. Minnesota Phalaenidae (Noctuidae). The seasonal history and economic importance of the more common and destructive species. Minn. Agr. Exp. Sta. Tech. Bull. 165:1-128.
Light trap collections, seasonal history, and economic importance of *Agrotis gladiaria* are discussed. (21-22)

Leonard, M. D. 1928. A list of the insects of New York. Cornell Univ. Agr. Exp. Sta. Mem. 101:1-1121.
"1395 *F. gladiaria* Morr. Clay-backed cutworm. Rochester; Angle; Buffalo; Lancaster; Ithaca; Bangall; New Windsor; Rye; SI; LI: general (Eng). Sept.-early Oct." (662)

McDunnough, J. 1938. Checklist of the Lepidoptera of Canada and the United States of America. Part I. Macro-lepidoptera. So. Calif. Acad. Sci. Mem. 1:1-272.
Agrotis gladiaria Morr. is assigned number 1422 in this phylogenetic checklist. One synonym, *Agrotis morrisoniana* Riley, is given. (62)

Moore, S. 1955. An annotated list of the moths of Michigan exclusive of the Tineoidea (Lepidoptera). Univ. Mich. Misc. Pub. 88:1-87.
Michigan county records of *Feltia gladiaria* are given. (15)

Morrison, H. K. 1874. Descriptions of new Noctuidae. Proc. Boston Soc. Nat. Hist. 17:131-166.
This is the original description by Morrison. "*Agrotis gladiaria* nov. sp. Expanse 34 mm. Closely allied to *pityochrous* Grote, but the antennae in this species are strongly pectinate; claviform spot large, encircled with black; exterior line absent. A series of cuneiform dashes before the sub-terminal line. Hab. Massachusetts." (162-163)

Morrison, H. K. 1875. List of a collection of Texan Noctuidae, with descriptions of the new species. Proc. Boston. Soc. Nat. Hist. 17:209-221.
"3. *Agrotis morrisoniana* Riley. This species will be described at length by Prof. Riley, who has bred it for several years and is acquainted with its larval and pupal stages." The moth is described. (214)

Morrison, H. K. 1875. Notes on the Noctuidae, with descriptions of certain new species. Proc. Acad. Nat. Sci. Phil. 27:55-71.
The male and female *Agrotis gladiaria* are described from specimens from St. Catherines, Ontario. (59)

Muesebeck, C. F. W. 1920. A revision of the North American species of ichneumon-flies belonging to the genus *Apanteles*. Proc. U. S. Nat. Mus. 58:483-576.
Apanteles griffini (Viereck) was a hymenopterous parasite of *Feltia gladiaria*. (548)

Muesebeck, C. F. W. 1922. A revision of the North American ichneumon-flies belonging to the subfamilies Neoneurinae and Microgasterinae. Proc. U. S. Nat. Mus. 61:1-76.
Microgaster feltiae Muesebeck was a hymenopterous parasite of *Feltia gladiaria*. The male parasite is described as a new species. (62-63)

Riley, C. V. 1875. Description of a new species of *Agrotis*. Proc. Boston Soc. Nat. Hist., 17:286-288.
The moth of the clay-backed cutworm, *Feltia gladiaria*, was described by Riley as *Agrotis morrisoniana* nov. sp. Subsequent authors believed these two species to be synonymous. (286-287)

Sherman, F. 1925. Work on approved projects. 47th Annu. Rep. North Carolina Agr. Exp. Sta., pp 68-77.
Feltia gladiaria was the earliest and most destructive early spring cutworm at Raleigh, N. C. The adults are not easily attracted to bait traps or lights. Pupae may be killed by summer cultivation. (73)

Smith, J. B. 1893. Catalogue of the lepidopterous superfamily Noctuidae found in boreal America. Bull. U. S. Nat. Mus. 44:1-424.
References given include Morrison's 1874 and 1875 papers, Grote's 1880 paper, and Riley's 1874 paper. Synonyms given for *Feltia gladiaria* include *Agrotis morrisoniana*. Morrison's type was deposited in the Tepper collection. (82)

Smith, J. B. 1899. Insects of New Jersey. Suppl. 27th Annu. Rep. State Board Agr., pp. 1-755.
"*F. gladiaria* Morr. Hopatcong (Pm), Newark, at light, IX and X, Staten Island (Ds), New Brunswick, IX, 18, and should occur throughout the state." (409)

Smith, R. C. and E. G. Kelly. 1939. The eighth annual insect population summary of Kansas, covering the year 1938. Kan. Acad. Sci. Trans., 42:303-323.
The clay-backed cutworm, *Agrotis gladiaria* Morr., was the most abundant species in pastures during March and April, especially where little barley was present. (314)

Smith, R. C., E. G. Kelly, G. A. Dean, H. R. Bryson, and R. L. Parker. 1943. Common insects of Kansas. Rep. Kansas State Board Agr., 62(255):1-440.
The moth of *Agrotis gladiaria* is described and illustrated. Larvae were common in the spring around roots of sweet clover at Manhattan, Kansas. (241)

Stedman, J. M. 1906. The more important insects injurious to corn in Missouri. Mo. Board Agr. Rep. 38:271-286.
"The larvae of the clay-backed cutworm is about one and one-fourth inches in length when full grown and is of dark brown or greenish color, with a light colored streak along the back. They occur in variable numbers, depending upon the season, sometimes becoming quite scarce and then appearing in overwhelming numbers and causing serious and widespread trouble. This variation in numbers depends very largely upon a bacterial disease, which seems to attack them and kill them off very rapidly, especially when the larvae become unduly abundant. They are also, like most cutworms, subject to the attacks of parasitic insects and birds. These clay-backed cutworms prefer clover in preference to bluegrass, and attack the corn fields more, especially when the corn follows the clover field previously turned under; or where the insects are infesting neighboring clover fields in undue numbers, they frequently leave these fields in great abundance, sometimes in a body similar to the armyworm, and are then likely to spread to the corn field and devour it, like unto the well-known armyworm attack, eating the leaves of the corn plant instead of cutting the plant down, as is the case with most cutworms. Their work in the corn fields always consists of eating the leaves and the stems above ground. The larvae are most abundant from the middle of April through May. After May they enter the earth, so that by the middle of June practically all of them have disappeared. They remain in the ground in a dormant condition for upwards of 6 weeks before they transform to the pupa stage, the moths appearing during September, and soon depositing their eggs. Figure 38 represents a moth enlarged.

"The best method of protecting a corn field from the attack of these worms is to plow a furrow along the side nearest the clover field, with vertical side toward the corn, and then dig post holes every 5 or 6 feet in this furrow. When the larvae leave the clover field for the corn, not being able to cross the vertical furrow, they will crawl along and fall into the post holes. One can also kill great numbers by scattering poisoned clover or bran about the parts of the corn field where the larvae are entering. Where one wishes to plant corn in a clover field the following year, he can prevent these adults from laying their eggs nearby by plowing the clover field under by the middle of September." (282-283)

Tietz, H. M. 1951. The lepidoptera of Pennsylvania. A manual. Penn. Agr. Exp. Sta., pp. 1-194.
References, distribution, life history, and food plants are given for the clay-backed cutworm, *Feltia gladiaria*. (51-52)

Tietz, H. M. 1972. An index to the described life histories, early stages and hosts of the macrolepidoptera of the continental United States and Canada. Allyn Museum of Entomology, Sarasota, Fla., 1041 pp.
This publication includes a list of periodicals, journals, bulletins, and memoirs which deal with lepidopterous life histories and host plants. It also contains a list of insect common names and another list of common names of plants upon which lepidopterous insects feed. The species names are listed alphabetically with synonyms, references dealing with life history, and food plants.

Turner, W. B. 1918. Female Lepidoptera at light traps. J. Agr. Res., 14(3):135-149.
An attempt was made to determine the ratio of males to females taken in light traps and to determine the stage of egg development (gravid or spent). No attempt was made to determine the species of the genus *Feltia*, but the author states it is probable the species included *subgothica, annexa, gladiaria,* and *jaculifera*. (136)

United States Department of Agriculture Cooperative Economic Insect Report[1]

The Bureau of Entomology of the U. S. Department of Agriculture, in cooperation with the State Entomologists, Entomologists of the Agricultural Experiment Stations, State Departments of Agriculture, Agricultural Colleges, and other entomological agencies, organized an Insect Pest Survey in 1921. This survey attempted to assemble and disseminate all data on the distribution, seasonal and regional fluctuations of insect abundance, weather data as related to insect outbreaks, phenological data, and other miscellaneous information. Each year an annual digest of the important facts gathered during the past season was published in the form of Insect Pest Summaries.

From 1921 to 1950, this publication was entitled "The Insect Pest Survey Bulletin." This was not bound or indexed for the years 1942-1949. In 1951, the Bulletin was replaced by the "Cooperative Economic Insect Report," Vol. 1, No. 1, July 31, 1951. No explanation is given in this publication for the name change.

1922. U. S. Dep. Agr. Ins. Pest Surv. 2:39.
Clay-backed cutworms appeared on alfalfa in Nebraska.

1924. U. S. Dep. Agr. Ins. Pest Surv. 4:70.
Cutworms of the species *Feltia gladiaria* were received from South Euclid, Ohio, where they were doing heavy damage in hotbeds.

1925. U. S. Dep. Agr. Ins. Pest. Surv. 5:133-134.
The clay-backed cutworm, *Feltia gladiaria*, caused damage to tobacco in Virginia and Kentucky.

1926. U. S. Dep. Agr. Ins. Pest Surv. 6:61.
Clay-backed cutworms were found on tomatoes and peas in Mississippi.

1930. U. S. Dep. Agr. Ins. Pest Surv. 10:85, 137.
The clay-backed cutworm, *Feltia gladiaria* Morr., was abundant in the vicinities of Grinnell, Oakley, and Greenfield, Kansas. (85) The clay-backed cutworm caused damage to corn in Illinois. (137)

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[1] Issued by Plant Protection and Quarantine Programs, Animal and Plant Health Inspection Service, U. S. Department of Agriculture.

1931. U. S. Dep. Agr. Ins. Pest Surv. 11:90, 162, 247, 653.
In Kentucky, the clay-backed cutworm, *Feltia gladiaria* Morr., was doing serious damage to clover, oats, and tobacco in beds. (90) In Kentucky, the clay-backed cutworm was especially abundant on tobacco in beds, garden crops, and corn. (162) A rise in the abundance of clay-backed cutworms was reported from Illinois. (247) Reports of cutworm damage in the west-central states included the clay-backed cutworm. (653)

1932. U. S. Dep. Agr. Ins. Pest Surv. 12:131, 132.
The clay-backed cutworm, *Feltia gladiaria* Morr., has been reported from several sections of the state of Kentucky, where it has caused much damage to grass, clover, alfalfa, and tobacco in beds. (131) "There seemed to be many cutworms in my garden at Webster Groves, Mo. Nearly all appeared to be *Feltia gladiaria*." (132)

1933. U. S. Dep. Agr. Ins. Pest Surv. 13:106, 145, 150.
Feltia gladiaria Morr. was scarce on onions at Kosciusko, Miss. (106) The clay-backed cutworm occasioned serious injury in central and northern Illinois. (145) In the north central part of Illinois, many spring-plowed fields have been seriously damaged by the clay-backed cutworm, *Feltia gladiaria* Morr. (150)

1934. U. S. Dep. Agr. Ins. Pest Surv. 14:96.
Damage from cutworms, mostly the clay-backed (*Feltia gladiaria* Morr.), have been reported in many cases from spring-plowed clover and sweet clover fields.

1938. U. S. Dep. Agr. Ins. Pest Surv. 18:55, 92, 152, 246.
In Kansas, small larvae of the clay-backed cutworm (*Feltia gladiaria* Morr.) are common in areas where little barley is the dominant grass. (55) Clay-backed cutworms, *Feltia gladiaria* Morr., are present in large numbers and are causing much damage to young tobacco plants in beds and to clover and alfalfa. They seem to be generally distributed over Kentucky. (92) The clay-backed cutworm caused serious losses to early planted corn in Illinois. (152) The clay-backed cutworm caused moderate damage to cotton following cover crops in Philadelphia, Miss. (246)

1941. U. S. Dep. Agr. Ins. Pest Surv. 21:11
Specimens of the clay-backed cutworm, *Feltia gladiaria* Morr., were received from Hancock County, Miss., where they were feeding on vegetables in December.

Walkden, H. H. 1943. Cutworm and armyworm populations in pasture grasses, waste lands and forage crops. J. Econ. Entomol., 36(3):376-381.
The abundance of cutworms and armyworms in 14 types of pasture grasses, waste lands, and forage crops in the vicinity of Manhattan, Kansas, was studied during the 4-year period 1937 to 1940. A sack-trap collection method was used to determine the comparative abundance of the cutworms and armyworms occurring in the various habitats. *Agrotis gladiaria* was one of the most abundant species found. The larval stages were most abundant in sack traps in March and early April. The greatest percentage (49.6) of larvae were taken in little barley pastures, while 18.9% were collected in overgrazed pastures. Smaller numbers of larvae were collected in bluegrass, sweet clover, alfalfa, native hay meadow, little bluestem, orchard-bromegrass, and wild rye fields. Of the larvae collected, 10.6% were killed by pathogens and 5.8% by hymenopterous parasites.

Walkden, H. H. 1950. Cutworms, armyworms and related species attacking cereal and forage crops in the central Great Plains. U. S. Dep. Agr. Circ. 849:1-52.
Agrotis gladiaria is included in a key to cutworms and its distribution, eco-

nomic status, food plants, larval habits, seasonal history, reproductive capacity, and natural enemies are discussed. In the central great plains, this cutworm occasionally becomes abundant in pasture lands and alfalfa but does not reach destructive abundance. The author found mostly seven but sometimes eight instars in the larvae. Natural enemies identified were *Meteorus vulgaris* (Cress.), *Microplitis feltiae* Mues., *Exetastes obscurus* Cress., *Netelia* sp., *Apanteles griffini* Vier., *Ophion* sp., *Winthemia quadripustulata* (F.), *Metarrhizium anisopliae* (Metsch), and *Sorosporella uvella* (Krass). (13-14)

Walkden, H. H. and D. B. Whelan. 1942. Owlet moths (Phalaenidae) taken at light traps in Kansas and Nebraska. U. S. Dep. Agr. Cir. 643:1-25.
Light traps were operated for various periods in six localities in Kansas and Nebraska during the period 1934-37 in order to obtain information on the flight periods and abundance of owlet moths (Phalaenidae). During the 4-year period, 305 species of Phalaenidae were taken. The seasonal distribution of *Agrotis gladiaria* is illustrated for the years 1935 to 1937. Twenty-seven percent of the total of 185 *A. gladiaria* trapped were females. (14)

Whelan, D. B. 1935. A key to the Nebraska cutworms and armyworms that attack corn. Neb. Agr. Exp. Sta. Res. Bull. 81:1-27.
The description, distribution, seasonal abundance, habits, and food plants of the clay-backed cutworm, *Feltia gladiaria* Morrison, are discussed. Host plants include corn, clover, tobacco, potato, tomato, sweet potato, bean, onion, raspberry, oats, grass, aster, goldenrod, and pansy. (16-17)

Index

This index was prepared on the computer from keywords indicated on the index card file. Information may be retrieved by author's name (left-hand column) and year (right-hand column); by host plant, by geographical locality, and by subject, i.e., larval description, life history, outbreak, geographical distribution, etc. The Insect Pest Survey is abbreviated as IPS.